



Patent  
Attorney's Docket No. 030681-351

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

) **BOX AF**

Byung-kyu LEE

) Group Art Unit: 1773

Application No.: 10/032,103

) Examiner: H.C. Rickman

Filed: December 31, 2001

) Confirmation No.: 5887

For: PERPENDICULAR MAGNETIC  
RECORDING MEDIUM

**REPLY TO FINAL OFFICE ACTION**

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TC 1700

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In reply to the final Office Action dated September 8, 2003, Applicant respectfully requests reconsideration of the above-captioned application. Claims 1-21 are currently pending.

The final Office Action includes a rejection of claims 1-4, 6, 7, 9, 12, 13, 15, 17 and 19 under 35 U.S.C. §102(e) as allegedly being anticipated by or, in the alternative, under 35 U.S.C. §103(a) as being obvious over the *Ikeda et al.* patent (U.S. Patent 6,468,670). This rejection is respectfully traversed.

In reviewing Applicant's previous response, it occurs to the undersigned that the argument being made was not sufficiently clear. As illustrated in Figure 1 of the *Ikeda* patent, the *Ikeda* patent includes a glass substrate, and an optional soft underlayer on which a layer of nickel aluminum alloy (NiAl) layer is deposited. This layer of nickel aluminum

alloy is mentioned only once at column 3, lines 32-34 of the *Ikeda* patent and its function is not described.

The Office makes the assumption that the nickel aluminum alloy layer meets the recitation of a perpendicular orientation promoting underlayer between a substrate and a perpendicular magnetic recording layer. Applicant respectfully submits that this is not the case. As evident by the *Do et al.* patent (U.S. Patent 6,537,638)<sup>1</sup>, in perpendicular magnetic recording mediums, a nickel aluminum alloy layer acts as an underlayer structure rather than a sublayer that promotes perpendicular orientations in a perpendicular magnetic recording layer. In the *Ikeda* patent, as in the *Do et al.* patent, the titanium film encourages perpendicular anisotropy of the CoCr granular layer (or other materials forming a perpendicular magnetic recording layer). Hence, Applicant respectfully submits that the nickel aluminum alloy layer does not meet the claim recitation in independent claims 1 and 17 of a "perpendicular orientation promoting underlayer" in the context of the claims.

To the degree an analogy can be drawn, the first layer in the *Ikeda* patent to meet this recitation of a perpendicular orientation promoting underlayer would be the titanium layer. However, in the *Ikeda* patent, the CoCr granular host layer is formed immediately on the titanium film and therefore the *Ikeda* patent fails to meet a crystal growth discontinuation layer between the perpendicular orientation promoting underlayer (the Ti film in the *Ikeda* patent, by analogy, of the *Ikeda* patent ), and the perpendicular magnetic

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<sup>1</sup> For the convenience of the Examiner, a copy of this patent and a form PTO-1449 are enclosed. Return of an Examiner-initialed copy of the form PTO-1449 is respectfully requested.

recording layer (the CoCr granular layer, by analogy, of the *Ikeda* patent) for suppressing continuous crystal growth from the underlayer to the perpendicular magnetic recording layer.

Because the structures and compositions are different, Applicant respectfully submits that the doctrine of inherency does not operate here and, in fact, the references are fairly clear that the structure recited in the present claims is not met by the *Ikeda* patent.

It is reiterated that upon further review of Applicant's previous comments, this argument may not have been abundantly clear insofar as the undersigned mistakenly thought that the quoted passage from the *Ikeda* patent would sufficiently illustrate that the Ti film was the only film remotely analogous to the recitation of a perpendicular orientation promoting underlayer, but did not expressly state that the nickel aluminum alloy layer did not fill this role.

Having clarified the arguments, Applicant respectfully requests reconsideration and allowance of these claims.

The final Office Action also includes a rejection of claims 1-8, 10-14, 16-18, 20 and 21 under 35 U.S.C. §102(e) or, in the alternative, under 35 U.S.C. §103(a) as obvious over the *Lambeth et al.* patent (U.S. Patent 6,248,416). This rejection is respectfully traversed.

The *Lambeth et al.* patent, as explained previously, is directed to a magnetic or magneto-optic recording medium incorporating thin films promoting highly oriented cobalt or cobalt alloy magnetic layers for use in the magnetic recording media and transducers.

The *Lambeth et al.* patent discusses recording performance being related to grain size and grain separation in the magnetic layer, at column 3, lines 56-64, and perpendicular recording at column 6, lines 26-47. Additionally, the *Lambeth et al.* patent discusses the use of a soft magnetic "keeper layer" at column 6, lines 55-65. It does not, however, disclose the use of a crystal growth discontinuation layer, as recited in the pending claims.

In more detail, at column 10, lines 59 *et seq.*, a magnetic recording medium is described as having a substrate 12, an underlayer 14, and a magnetic layer 16. The structure may include a plurality of underlayers and/or magnetic layers. Of relevance to the present discussion is the intermediate layer 22, which shares the same relative position as Applicant's crystal growth discontinuation layer, as illustrated in Figure 2b. At column 11, lines 1-9, this intermediate layer is largely undescribed other than its location and that it is part of the underlayer structure. It is noted, however, that the underlayers 14 and 20 "are generally comprised of a material suitable for producing epitaxial growth of the magnetic layer 16," as disclosed at column 11, lines 47-50. At column 13, lines 23-41, various suitable underlayer materials are disclosed which include Ti alloys. Hence, it is believed that the intermediate layer 22 is designed to promote epitaxial growth, and therefore does not constitute a crystal growth discontinuation layer, as this term is used in the present application.

This position is further supported by the specific disclosure regarding perpendicular recording beginning at column 20 line 56 *et seq.* and its emphasis on the crystal orientation.

For instance, at column 21, lines 26-40, the *Lambeth et al.* patent describes an Ag/Ti/Co based layer structure which reads as follows:

[Lambeth et al.] have found that very well oriented (0002) Co-based layers can be epitaxially grown using (111) fcc as a template through the use of an intermediate hcp template. Specifically, if Ti is deposited on (111) Ag, the Ti will assume a (0002) orientation which has a similar atomic face lattice to the fcc (111) orientation, as shown in FIG. 22. The (0002) orientation of Ti significantly improves the Co-based layer to grow epitaxially in a (0002) orientation to produce a recording media having a nearly ideal perpendicularly oriented recording layer. A comparison of the lattice constants of Ti ( $a=2.9512$ ,  $c=4.6845$ ) and Co ( $a=2.507$ ,  $c=4.070$ ) reveal a mismatch between the lattices; however, the long range orientation of the Ag and resulting Ti layers provides for the alignment of a 6.times.6 mesh of Co unit cells with a 5.times.5 mesh of Ti unit cells.

As summarized in column 22, lines 21-23, "[t]he presence of a thin Ag layer enhances the epitaxial growth of Ti and this results in an enhance[d] CoCrPt (0002) peak." Applicant respectfully submits that the relationship of the various layers as enhancing epitaxial growth could not be fairly described as meeting the recitations of either independent claim 1 or independent claim 17. For instance, claim 1 recites a "perpendicular orientation promoting underlayer between a substrate and a perpendicular magnetic recording layer for inducing the perpendicular orientation of the perpendicular magnetic recording layer, the perpendicular magnetic recording medium further comprising a crystal growth discontinuation layer between the perpendicular orientation promoting underlayer and the perpendicular magnetic recording layer for suppressing the continuous crystal growth from the underlayer to the perpendicular magnetic recording layer." Similar recitations exist in claim 17.

Attorney's Docket No. 030681-351

Application No. 10/032,103

Page 6

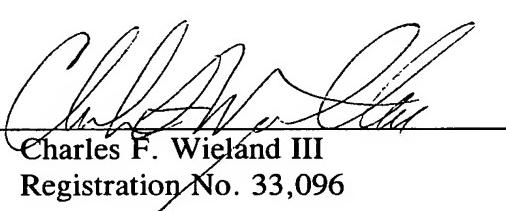
In light of the foregoing, Applicant respectfully requests reconsideration and allowance of the above-captioned application. Should any residual issues exist, the Examiner is invited to contact the undersigned at the number listed below.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

Date: December 8, 2003

By:



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